



**KNOWLEDGE AND PRACTICES OF WATER CONSUMPTION AND
ASSOCIATED HEALTH EFFECTS AMONG PREGNANT WOMEN IN
SAVAR: A CROSS-SECTIONAL STUDY**

A PROJECT REPORT

BY

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Submitted to the Department of Nutrition and Food Engineering in the partial fulfillment
of B.Sc. in Nutrition and Food Engineering

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APPROVAL

This project “**Knowledge and Practices of Water Consumption and Associated Health Effects Among Pregnant Women in Savar: A Cross-Sectional Study**” submitted by **Mir Monadil Hasan** bearing ID: 201-34-274 to the Department of Nutrition and Food Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Nutrition and Food Engineering and approved as to its style and contents.

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Dr. Md. Mahbubur Rahman, Associate Professor** and Co-supervision of **Md. Harun-Ar Rashid, Assistant, Professor Department** of Nutrition and Food Engineering, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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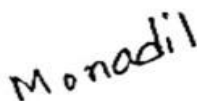
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ABSTRACT

This study explores the relationship between water consumption, hydration knowledge and practices, and their impact on hydration status, urinary tract infection (UTI) prevalence, and amniotic fluid levels in pregnant women. The findings reveal significant trends in hydration behaviors and highlight the role of education and awareness in improving maternal health outcomes. Analysis indicates that hydration knowledge significantly correlates with age, education level, profession, and residential area ($p < 0.05$). Participants aged 22–25 years and those with tertiary education exhibited the highest levels of good knowledge (77.8% and 90.9%, respectively). Suburban residents also demonstrated better knowledge compared to rural residents (81.0% and 62.1%, $p < 0.001$). Knowledge was significantly associated with better water consumption practices, as participants with good knowledge exhibited superior practices (61.9%) compared to those with low knowledge (35.2%, $p < 0.001$). Water intake significantly influenced hydration levels and UTI incidence. Participants consuming more than 4 liters of water daily had optimal hydration (100%) and no UTIs, whereas 50% of those drinking less than 1-liter reported UTIs ($p < 0.001$). These results align with evidence supporting the role of adequate hydration in reducing UTI risk. However, water intake showed no significant relationship with amniotic fluid levels ($p = 0.328$), suggesting that other physiological factors predominantly determine amniotic fluid status. The study underscores the importance of promoting water consumption and health literacy among pregnant women, particularly in rural and less-educated populations. Integrating hydration education into prenatal care programs and community health initiatives could mitigate UTI risk and improve maternal health outcomes.

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CHAPTER 1

INTRODUCTION

1.1 Background

Water is essential for human life, playing a crucial role in maintaining physiological balance and supporting overall health. During pregnancy, the importance of water is magnified, as the body undergoes complex biological and metabolic changes that heighten fluid requirements. Pregnant women need increased water intake to support the expansion of blood volume, production of amniotic fluid, and additional metabolic processes necessary for fetal development (Song et al., 2023). Proper hydration is therefore vital not only for the mother's health but also for the developing fetus, making water consumption a key aspect of prenatal care (American College of Obstetricians and Gynecologists [ACOG], 2019).

The American Medical Research Institute recommends a daily water intake of 2700 mL for pregnant women, which is 300 mL higher than the intake level for non-pregnant women. This increase supports fetal circulation, amniotic fluid production, and a higher maternal blood volume (Montgomery, 2002). Insufficient water intake during pregnancy can lead to dehydration, which affects cognitive and physical abilities and increases the risk of urinary and cardiovascular diseases, such as kidney stones, urinary tract infections, and chronic kidney disease (Zhang et al., 2020). However, many pregnant women, particularly in low- and middle-income countries (LMICs), do not meet these hydration guidelines, leading to potential adverse health outcomes.

Despite the recognized benefits of adequate water intake, many pregnant women are unaware of recommended hydration levels and their health effects. In developing countries like Bangladesh, these challenges are compounded by limited healthcare access, socioeconomic barriers, and inadequate public health education. Rural communities, in particular, face disparities in access to health information, contributing to health inequalities (Chen et al., 2019). Additionally, cultural practices, misconceptions, and limited access to accurate health information can shape water consumption habits (Popkin et al., 2010).

At a national level in Bangladesh, 91.4% of households have access to improved drinking water, with rural households reporting higher access (BRAC James P Grant School of Public Health & National Nutrition Services, 2019). However, many people in rural or peri-urban areas, including pregnant women, do not meet the recommended water intake, often due to cultural practices or lack of knowledge.

Maternal health remains a significant public health concern in Bangladesh, particularly in peri-urban areas like Savar, where access to clean water and awareness of hydration's health benefits are limited. The maternal mortality rate (MMR) in Bangladesh is 173 per 100,000 live births, and dehydration is a contributing factor to adverse pregnancy outcomes, such as preeclampsia and eclampsia (Hossain et al., 2023).

Given these knowledge gaps and the lack of research in peri-urban areas like Savar, this cross-sectional study aims to assess the knowledge, practices, and perceptions surrounding water intake among pregnant women in the region. By examining the relationship between water consumption and maternal health, this study seeks to deepen understanding of hydration practices during pregnancy and provide evidence to support interventions that improve maternal and neonatal health outcomes in Bangladesh.

1.2 Significance of the Study

This study explores the knowledge and practices regarding water consumption among pregnant women in Savar a semi-urban area. Adequate hydration is crucial for maternal and fetal health, helping to prevent complications like dehydration, Urinary tract infection, low or high amniotic fluid, preterm labor and low birth weight. By identifying gaps in hydration practices and awareness, the research will inform public health interventions aimed at improving pregnancy outcomes in resource-limited settings. The findings will also support global health goals related to maternal well-being and access to clean water, particularly in rapidly urbanizing regions.

1.3 Research Question

What is the knowledge level and practices regarding water intake among pregnant women and how do these factors affect their hydration status and health outcomes?

1.4 Objectives

1.4.1 General Objective

The aim of the study is to assess the knowledge, practices, and health effects related to water intake and hydration status among pregnant women.

1.4.2 Specific Objectives

- To evaluate knowledge level of pregnant women about water intake during pregnancy according to socio-demographic characteristics of the participants.
- To identify the water consumption practices among pregnant women according to socio-demographic characteristic and hydration knowledge.
- To examine the relationship between water intake knowledge, practice, hydration and other health complications.

CHAPTER 2

LITERATURE REVIEW

2.1 Importance of Water Intake During Pregnancy

Water is a fundamental component of the human body, which cannot produce sufficient water solely through metabolism or acquire it fully from food intake. Thus, regular attention to daily water consumption is essential to avoid negative health outcomes (Jéquier & Constant, 2010). The most common result of inadequate water intake is dehydration, presenting symptoms like extreme thirst, infrequent urination, dark-colored urine, fatigue, dizziness, and confusion (Mayo Clinic, 2021). During pregnancy, water becomes even more crucial as it supports vital physiological functions, such as maintaining amniotic fluid, aiding digestion, and enhancing nutrient absorption. Pregnant women require additional water to meet the increased metabolic demands for both their own health and fetal development (Kleiner, 1999).



Figure 1: Importance of Maternal Hydration

Adequate maternal hydration can help increase amniotic fluid volume, which may aid in managing or preventing oligohydramnios, particularly before labor or certain medical interventions (Hofmeyr et al., 2002).



Figure 2: Benefit of adequate water intake

Insufficient hydration can lead to complications like constipation, urinary tract infections, and even preterm labor (Institution of Medicine, 2005). Pregnant and breastfeeding women

are encouraged to increase fluid intake to meet their bodies' needs (Montgomery, 2002), yet awareness of these requirements remains limited in semi-urban areas where healthcare infrastructure may be underdeveloped.

2.2 Knowledge of Hydration Needs

Bangladesh has long faced significant disparities in healthcare, particularly between rural and urban areas, affecting the accessibility and quality of care. Over 66% of Bangladesh's population lives in rural areas, where healthcare access is often interrupted or limited (Akter & Kabir, 2023). Consequently, many pregnant women are unaware of recommended water intake levels during pregnancy, with some expressing concerns about frequent urination or discomfort from drinking larger amounts of water. Such misconceptions can prevent women from achieving adequate hydration, increasing the risk of dehydration-related complications. Studies in semi-urban Kenya found that women who attended antenatal care (ANC) services regularly had a significantly better understanding of hydration needs than those who did not. In contrast, limited ANC access led women to rely on traditional beliefs, often resulting in insufficient water intake knowledge (Downe et al., 2019). Socioeconomic factors, including social status, education, and financial resources, influence health literacy (Sørensen et al., 2015). Women with higher education were more likely to understand the benefits of water intake, while those in lower-income, semi-urban areas had lower levels of awareness.

2.3 Practice of Water Intake During Pregnancy

Research shows that while some pregnant women prioritize water intake, others may consume less than recommended due to misconceptions or logistical barriers (Nisar et al., 2020). In some areas, there is a belief that high water intake might increase amniotic fluid to risky levels (Smith, 2016). Socioeconomic factors also impact access to clean water, with women in lower-income areas sometimes facing challenges in meeting hydration needs due to limited resources (World Health Organization, 2017). Water intake practices vary between urban and rural areas, with urban women generally having better access to safe drinking water and healthcare resources, thus raising their awareness of hydration's importance during pregnancy. Rural areas, especially in regions like sub-Saharan Africa, often lack access to clean water, leading some women to rely on untreated water sources, which may present health risks (World Health Organization, 2017). Some pregnant women prefer certain types of water, such as filtered or boiled, for perceived safety. Many also adjust their intake based on routine, increasing it during warmer seasons or after physical exertion (Schulze & Kroke, 2002). However, studies show that knowledge of specific hydration needs in pregnancy remains limited, with few women receiving guidance on optimal water intake (Popkin et al., 2010).

2.4 Health Implications of Inadequate Water Intake

The consequences of poor hydration during pregnancy are well-documented. When the body loses more fluid than it takes in, it cannot function normally, leading to dehydration (Mayo Clinic, 2021). Dehydration during pregnancy not only causes physical symptoms like headaches, dizziness, and fatigue but may also heighten psychological stress, impacting mental health and well-being. This strain can reduce overall quality of life during

pregnancy (Bennett et al., 2014);(Mayo Clinic, 2021). Dehydration has been linked to urological issues (e.g., urinary tract infections and kidney diseases), gastrointestinal problems (e.g., constipation), circulatory issues (e.g., reduced blood volume), and neurological disorders. Excessive fluid intake, however, may lead to cardiopulmonary disorders, hyponatremia, edema, and gastrointestinal complications (El-Sharkawy et al., 2015). Dehydration during pregnancy can also cause uterine irritability, potentially increasing the risk of preterm labor by stimulating the release of oxytocin, a hormone involved in labor initiation. This dehydration-induced uterine activity can lead to early contractions, heightening the risk of complications such as low birth weight, respiratory problems, and developmental challenges for the newborn (Garcia & Fanelli, 2018); (American College of Obstetricians and Gynecologists [ACOG], 2019)).

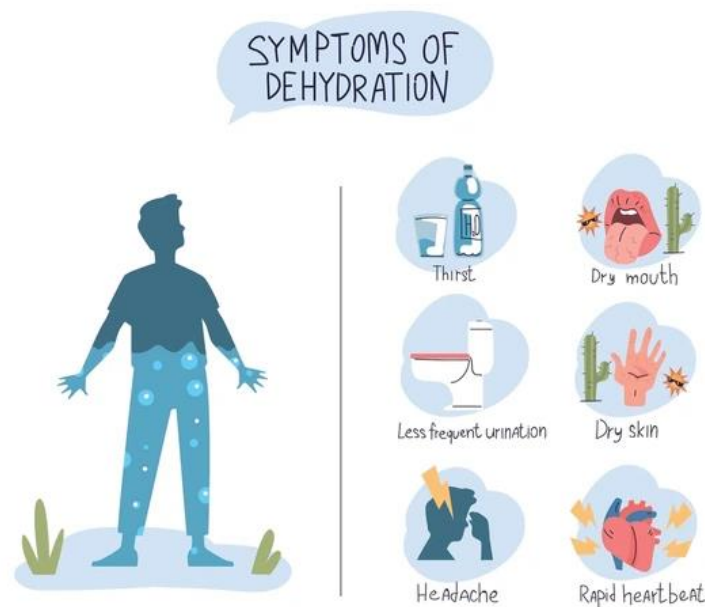


Figure 3: Symptoms of Dehydration

Amniotic fluid, which surrounds and protects the fetus, partly relies on maternal hydration levels. Insufficient water intake can result in low amniotic fluid (oligohydramnios), potentially affecting fetal movement and growth. Low amniotic fluid is associated with a higher risk of birth complications, such as cord compression, restricted fetal growth, and an increased likelihood of cesarean delivery (Smith, 2016). A normal amniotic fluid index ranges from 5 to 25 cm, with levels below 5 cm indicating oligohydramnios and levels above 25 cm indicating polyhydramnios (Lord et al., 2024).

CHAPTER 3

MATERIALS AND METHODS

3.1 Methodology

3.1.1 Study Design

The knowledge and practice of water consumption and associated health effects was assessed using cross-sectional methodology.

3.1.2 Study Population

Pregnant women and in their second or third trimester age range 18 to 32 who visited Safat Clinic & Diagnostic center for checkup.

3.1.3 Study Area

The study is conducted in a private hospital named Safat Clinic & Diagnostic Center located at Zirani, Savar, Dhaka.

3.1.4 Sample Size Calculation

The sample size calculation was estimated using the Cochran's formula:

Here,

n= Number of samples

Z = z-score (1.96 at 95% confidence interval).

p = prevalence of pregnant women complied with adequate water intake, 28% (Zhou et al., 2019)

e = marginal error, 5%.

$$n = \frac{Z^2 p(1-p)}{e^2} = \frac{1.96^2 \times 0.28(1-0.28)}{0.05^2} = 309.79 \approx 310$$

The calculated sample size required for the study was 310. Finally, 311 responses were collected.

3.1.5 Sampling Method

Simple random selection of expecting mother who are in second or third trimester who visited Safat Clinic and Diagnostic Center in the morning or evening.

3.1.6 Inclusion and Exclusion Criteria

Inclusion Criteria

- Only included pregnant women who are in second or third trimester of their pregnancy.
- Pregnant women age ranged in 18-32.
- A patient who had an ultrasonogram of pregnancy profile and urine test.
- Included who were willing to participate.

Exclusion Criteria

- Pregnant women who are in first trimester of pregnancy.
- Excluded who were aged more than 32.
- Patient who has not received ultrasonogram of pregnancy profile.
- Excluded them who were not interested to participate.

3.1.7 Study Procedure

This cross-sectional study carried out in the month of August- October 2024 at a private Hospital located in Savar. Participants were request to answer survey questionnaire. Ethical factors such as participant privacy, confidentiality, and well-being was taken top priority during the whole study. Ethical clearance was taken from the Faculty of Health and Life Sciences.

3.1.8 Field Procedure

After developing survey questionnaire data collection was made and collected data from participants according with the variables such as age, education level, occupation, residing area type, BMI, hydration knowledge, practice and health condition during pregnancy.

3.1.9 Questionnaire Development

In order to evaluate hydration knowledge, practice and health condition questionnaire created with such as general information, anthropometric measurement, hydration knowledge, practice and health condition questionnaire. The responder will provide variable permission for the purpose of the interview.

3.1.10 Scoring

Scoring method is used for determining knowledge level, water consumption practice and hydration level. Water consumption practice is categorized to good practice and poor practice using scoring method in SPSS. For correct response participants get 1 and 0 for wrong response. After calculating the sum scores are categorized. If score is less than 2 than it is considered as poor practice otherwise good practice. Same technique used for knowledge level. If score is less than 3 then knowledge level is considered poor and if greater than 3 its considered good knowledge. For hydration level less than 3 is considered good hydration level and greater than 3 is considered poor hydration level. Scoring method is also used to categorize age and BMI.

3.1.11 Statistical Analysis

Statistical analysis had been done by using IBM SPSS Statistics 27.0 software. Data were presented by frequency, percentages which was descriptive data and also cross-tabulation and chi-square tests were applied to see significance level and find out the relationship between independent variables and dependent variables. In all analyses, a p-value less than 0.05 was considered statistically significant.

CHAPTER 4

RESULTS & DISCUSSION

4.1 Results

The majority of participants are aged 22-25 years (37.6%), followed by those aged 26-29 years (28.0%), indicating that most are in early adulthood. The younger age groups 18-21 years and the older group 30-32 years each represent smaller proportions 17.4% and 17.0%, respectively.

Nearly half of the participants (49.8%) identify as housewives. This is followed by individuals in service roles (31.2%), with students and business professionals representing smaller portions 11.3% and 7.7%, respectively.

Table 1: Distribution of Participant According to Socio-Demographic Characteristics & Anthropometric Measurements

Variables	Categories	N (%)
Age Group	18-21 years	54 (17.4)
	22-25 years	117 (37.6)
	26-29 years	87 (28.0)
	30-32 years	53 (17.0)
Profession	Student	35 (11.3)
	Business	24 (7.7)
	Service	97 (31.2)
	Housewife	155 (49.8)
Education Level	No Formal Education	24 (7.7)
	Primary Education	79 (25.4)
	Secondary Education	164 (52.7)
	Tertiary Education	44 (14.1)
Type of Residing Area	Rural	153 (49.2)
	Sub-urban	158 (50.8)
Gestational Age	Second Trimester	152 (48.9)
	Third Trimester	159 (51.1)
BMI Status	Underweight	37 (11.9)
	Normal range	214 (68.8)
	Overweight	33 (10.6)
	Obese (Class I)	24 (7.7)
	Obese (Class II)	3 (1.0)

The highest educational attainment among participants is secondary education (52.7%), indicating a moderate level of education overall. Primary education is also common

(25.4%), with smaller groups having tertiary education (14.1%) or no formal education (7.7%).

The population is nearly evenly split between rural (49.2%) and sub-urban (50.8%) living areas, offering a balanced perspective across both settings.

The sample is split between second trimester (48.9%) and third trimester (51.1%) gestational stages, enabling an analysis of health indicators across advanced pregnancy stages.

Most participants fall within the normal BMI range (68.8%), indicating a generally healthy weight status among this group. Smaller portions are underweight (11.9%) or overweight (10.6%), with a minority classified as obese (Class I: 7.7%, Class II: 1.0%).

Table 2: Association Between Knowledge Level about Water Consumption and According to Socio- Demographic Characteristics

Variables	Categories	Knowledge Level about water consumption		P-Value
		Poor N (%)	Good N (%)	
Age Group	18-21 years	23 (42.6)	31 (57.4)	0.05
	22-25 years	26 (22.2)	91 (77.8)	
	26-29 years	23 (26.4)	64 (73.6)	
	30-32 years	16 (30.2)	37 (69.8)	
Profession	Student	6 (17.1)	29 (82.9)	0.011
	Business	5 (20.8)	19 (79.2)	
	Service	20 (20.6)	77 (79.4)	
	Housewife	57 (36.8)	98 (63.2)	
Educational Qualification	No Formal Education	13 (54.2)	11 (45.8)	<0.001
	Primary Education	30 (38.0)	49 (62.0)	
	Secondary Education	41 (25.0)	123 (75.0)	
	Tertiary Education	4 (9.1)	40 (90.9)	
Type of residing area	Rural	58 (37.9)	95 (62.1)	<0.001
	Sub-urban	30 (19.0)	128 (81.0)	
Gestational Age	Second Trimester	39 (25.7)	113 (74.3)	0.188
	Third Trimester	49 (30.8)	110 (69.2)	

Knowledge about water consumption significantly differed among age groups ($p=0.05$). The highest percentage of good knowledge was observed in the 22–25 years age group (77.8%), followed by the 26–29 years group (73.6%) and 30–32 years group (69.8%). In contrast, the 18–21 years group had the lowest proportion of participants with good knowledge (57.4%).

Knowledge levels varied significantly by profession ($p=0.011$). Students exhibited the highest proportion of good knowledge (82.9%), followed by individuals in business (79.2%) and service sectors (79.4%). Housewives had the lowest percentage of participants with good knowledge (63.2%).

A highly significant association was found between educational qualification and knowledge about water consumption ($p<0.001$). Participants with tertiary education had the highest percentage of good knowledge (90.9%), followed by those with secondary education (75.0%) and primary education (62.0%). Participants without formal education showed the lowest level of good knowledge (45.8%).

The type of residing area also showed a significant association with knowledge levels ($p<0.001$). Participants from sub-urban areas demonstrated higher good knowledge levels (81.0%) compared to those from rural areas (62.1%). No significant association was observed between gestational age and knowledge levels ($p=0.188$). However, participants in the second trimester had slightly higher good knowledge levels (74.3%) compared to those in the third trimester (69.2%).

Table 3: Association between water consumption practices among participants according to socio-demographic characteristics and knowledge about water consumption

Variables	Categories	Water consumption practices		P-Value
		Poor N (%)	Good N (%)	
Age Group	18-21 years	31 (57.4)	23 (42.6)	0.261
	22-25 years	51 (43.6)	66 (56.4)	
	26-29 years	39 (44.8)	48 (55.2)	
	30-32 years	21 (39.6)	32 (60.4)	
BMI Level	Underweight	15 (40.5)	22 (59.5)	0.482
	Normal range	103 (48.1)	111 (51.9)	
	Overweight	11 (33.3)	22 (66.7)	
	Obese (Class I)	11 (45.8)	13 (54.2)	
	Obese (Class II)	2 (66.7)	1 (33.3)	
Profession	Student	18 (51.4)	17 (48.6)	0.691
	Business	9 (37.5)	15 (62.5)	
	Service	42 (43.3)	55 (56.7)	
	Housewife	73 (47.1)	82 (52.9)	
Educational Qualification	No Formal Education	13 (54.2)	11 (45.8)	0.106
	Primary Education	40 (50.6)	39 (49.4)	
	Secondary Education	76 (46.3)	88 (53.7)	
	Tertiary Education	13 (29.5)	31 (70.5)	

Type of residing area	Rural	79 (51.6)	74 (48.4)	0.037
	Sub-urban	63 (39.9)	95 (60.1)	
Gestational Age	Second Trimester	68 (44.7)	84 (55.3)	0.75
	Third Trimester	74 (46.5)	85 (53.5)	
Knowledge Level about water consumption	Low Knowledge	57 (64.8)	31 (35.2)	<0.001
	Good Knowledge	85 (38.1)	138 (61.9)	

No significant association was found between age group and water consumption practices ($p=0.261$). However, participants aged 30–32 years demonstrated the highest proportion of good practices (60.4%), followed by the 22–25 years (56.4%) and 26–29 years (55.2%) groups. The 18–21 years age group had the lowest percentage of good practices (42.6%). BMI level did not show a significant association with water consumption practices ($p=0.482$). However, participants who were overweight exhibited the highest percentage of good practices (66.7%), while those classified as Obese (Class II) had the lowest percentage (33.3%).

No significant differences were observed among professions ($p=0.691$). Business professionals showed the highest percentage of good practices (62.5%), followed by individuals in service roles (56.7%) and housewives (52.9%). Students had the lowest percentage of good practices (48.6%). Although not statistically significant ($p=0.106$), water consumption practices improved with higher education levels. Participants with tertiary education reported the highest proportion of good practices (70.5%), while those with no formal education had the lowest (45.8%).

A significant association was found between the type of residing area and water consumption practices ($p=0.037$). Participants from sub-urban areas had better practices (60.1%) compared to those from rural areas (48.4%). No significant association was found between gestational age and water consumption practices ($p=0.75$). However, participants in the second trimester reported slightly better practices (55.3%) compared to those in the third trimester (53.5%).

Knowledge level was significantly associated with water consumption practices ($p<0.001$). Participants with good knowledge had a higher percentage of good practices (61.9%) compared to those with low knowledge (35.2%).

Table 4: Association between hydration status and water Consumption Patterns

Variables	Categories	Hydration Status		P-Value
		Good N (%)	Poor N (%)	
Amount of water consumed per day	<1 Liter	3 (30)	7 (70)	<0.001
	1-2 Liter	112 (89.6)	13 (10.4)	
	2-3 Liter	135 (98.5)	2 (1.5)	
	>4 Liter	39 (100)	0 (0.0)	
Water consumption practices	Poor Practice	131 (92.3)	11 (7.7)	0.672
	Good Practice	158 (93.5)	11 (6.5)	

A highly significant association was observed between the quantity of water consumed daily and hydration status ($p < 0.001$). Participants consuming larger amounts of water demonstrated better hydration levels. Those drinking >4 liters per day had 100% good hydration. Participants consuming 2–3 liters showed 98.5% good hydration. Those drinking 1–2 liters had 89.6% good hydration. However, participants consuming <1 liter had the poorest hydration with only 30% classified as having good hydration.

No significant association was found between water consumption practices and hydration levels ($p = 0.672$). However, participants with good practices had a slightly higher percentage of good hydration (93.5%) compared to those with poor practices (92.3%).

Table 5: Association between amount of water consumed and health effects

Variables	Categories	Water Consumed Per Day				P-Value
		<1 Liter N (%)	1-2 Liter N (%)	2-3 Liter N (%)	>4 Liter N (%)	
Urinary Tract Infection (UTI)	Yes	5 (50)	4 (3.2)	2 (1.5)	0 (0.0)	<0.001
	No	5 (50)	121 (96.8)	135 (98.5)	39 (100)	
Amniotic fluid index (AFI)	Oligo-hydramnios	0 (0.0)	5 (4.0)	2 (1.5)	0 (0.0)	0.328
	Adequate	10 (100)	119 (95.2)	133 (97.1)	37 (94.9)	
	Poly-hydramnios	0 (0.0)	1 (0.8)	2 (1.5)	2 (5.1)	

There is a significant association between daily water intake and UTI incidence ($p\text{-value} < 0.001$). Half of those consuming less than 1 liter per day have UTIs (50%), while UTI prevalence decreases substantially as water intake increases: only 3.2% in the 1–2 liter group, 1.5% in the 2-3 liter group and 0% in those drinking more than 4 liters. This suggests that increasing daily water intake may reduce the risk of UTIs.

Amniotic fluid levels (categorized as oligohydramnios, adequate, or polyhydramnios) show no statistically significant association with water intake (p -value = 0.328). Most participants regardless of water intake have adequate amniotic fluid levels (95.2%, 100%), while polyhydramnios is very rare but slightly more present in those drinking 2-3 liters or more than 4 liters daily.

4.2 Discussion

This study examines the relationship between daily water intake, hydration knowledge and practices and their effects on hydration status, incidence of urinary tract infections (UTIs) and amniotic fluid levels among pregnant women. Findings highlight significant trends, underscoring the importance of hydration education and awareness for improving maternal health outcomes.

The study sample is largely composed of young adults and housewives. The majority of participants were aged 22–25 (37.6%) and nearly half identified as housewives (49.8%). Most had secondary education (52.7%) and the group was nearly equally split between rural (49.2%) and suburban (50.8%) residents, offering a balanced perspective on hydration practices across various environments. These demographic factors are known to influence lifestyle choices, as occupation and education impact health knowledge and behaviors (Hooton, 2018; Magann et al., 2011).

Knowledge about water consumption was significantly associated with age, profession, educational qualification, and residing area. Participants aged 22–25 years exhibited the highest levels of good knowledge (77.8%), likely reflecting a greater focus on self-care and awareness during their reproductive years. Similarly, higher educational qualifications correlated strongly with better knowledge. Those with tertiary education (90.9%) demonstrated the highest levels of good knowledge. This highlights the link between education and hydration awareness, reflecting previous findings on the role of education in health literacy (Moore & Finney, 2017). Introducing hydration education in schools could help address gaps in knowledge among younger individuals and those with less formal education.

Participants residing in sub-urban areas also displayed better knowledge levels (81.0%) compared to those in rural areas (62.1%) indicating potential disparities in access to health education and resources. Water consumption practices did not show significant associations with most socio-demographic characteristics, including age, BMI, profession, and gestational age. However, participants with tertiary education had better practices (70.5%) compared to those with lower educational qualifications, aligning with the observed trends in knowledge levels. Additionally, residing in sub-urban areas was significantly associated with better water consumption practices ($p = 0.037$). These findings suggest a need for focused health literacy initiatives in rural areas to boost hydration awareness and habits, as health knowledge disparities between rural and urban areas are well-documented (Magann et al., 2011).

Participants with good knowledge about water consumption demonstrated significantly better practices (61.9%) compared to those with low knowledge (35.2%); $p < 0.001$. This

supports the idea that informed individuals are more likely to engage in health-promoting behaviors, underscoring the potential impact of improving water intake knowledge on hydration practices (Hooton, 2018)

A significant link was observed between water intake and UTI incidence. Half of those consuming less than 1 liter of water daily reported UTIs, whereas only 1.5% of those consuming 2–3 liters and none of those drinking more than 4 liters reported UTIs ($p < 0.001$). This aligns with research suggesting that adequate hydration can reduce UTI risk by increasing urinary output and removing pathogens (Schneeberger et al., 2014). Recommending a daily intake of at least 2 liters could be an effective preventive strategy for pregnant women, who are at higher risk of UTIs due to physiological changes (Moore & Finney, 2017).

While water intake showed a strong association with hydration levels ($p < 0.001$), no significant link was found between water intake and amniotic fluid levels ($p = 0.328$). Most participants had sufficient amniotic fluid levels, regardless of their water intake. This result aligns with studies suggesting that maternal hydration alone may not significantly impact amniotic fluid volume in uncomplicated pregnancies, as factors like fetal kidney function and placental health play larger roles (Magann et al., 2011). Nevertheless, promoting adequate hydration remains beneficial for overall maternal and fetal health, even if amniotic fluid levels are unaffected.

4.3 Strength and limitations

Strength

- This is the first research in Bangladesh to explore the relationship between hydration knowledge, practices, and health outcomes during pregnancy addressing a significant gap in local maternal health research.
- Offers a baseline for future studies and policies on hydration and maternal health in the country.

Limitations

- The study's reliance on self-reported data for water intake could introduce reporting bias, and the cross-sectional design limits the ability to make causal claims. Future longitudinal studies with objective hydration measures could provide more insights into the role of hydration in pregnancy outcomes.
- Research into additional factors influencing health effects may also be useful.

CHAPTER 5

CONCLUSION

5.1 Conclusion

This study highlights the critical role of hydration in maternal health, emphasizing its impact on urinary tract infection (UTI) incidence and overall well-being during pregnancy. Higher water intake was associated with a marked reduction in UTI prevalence, with no cases reported among participants consuming more than 4 liters daily. While hydration did not significantly affect amniotic fluid levels, adequate water intake remains essential for maternal health. Socioeconomic factors, including education and residence, strongly influenced hydration knowledge and practices. Urban participants and those with higher education demonstrated better hydration awareness, while rural housewives exhibited lower water intake and limited knowledge. These findings highlight the need for targeted health education programs, particularly for underserved populations, to bridge these disparities. Promoting hydration literacy through accessible and culturally sensitive interventions can improve pregnancy outcomes and reduce preventable health risks. Future research should further explore hydration's role in amniotic fluid regulation and its broader implications for maternal and fetal health. This study reinforces the importance of hydration education as a cornerstone of maternal healthcare, particularly for vulnerable groups.

5.2 Recommendations

- **Promotion of Hydration for Pregnant Women:** Given the association between lower water intake and a higher incidence of UTIs in the study, pregnant women, particularly in rural areas, should be educated about the importance of consuming adequate water. Health practitioners should emphasize daily hydration targets (e.g., at least 2-3 liters per day) during prenatal visits, particularly for those with low water intake.
- **Train healthcare providers:** Local healthcare provider can monitor and assess hydration levels during antenatal check-ups and give some guidelines for water consumption during pregnancy

By focusing on these recommendations, health organizations and policymakers can help bridge knowledge gaps, improve hydration practices, and reduce health risks related to dehydration, particularly among vulnerable populations like pregnant women.

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APPENDICES

Appendix 1: Questionnaire

Date- ____/____/____
ID- _____

Knowledge and Practices of Water Consumption and Associated Health Effects Among Pregnant Women in Savar: A Cross-Sectional Study

CONSENT FORM

Details of Head Researcher: Mir Monadil Hasan Safat

Introduction: I'm a student of B.Sc. 4th year student of Nutrition and Food Engineering Department at Daffodil International University. I am currently conducting a project which aims to understand the knowledge, habits, and health effects related to water intake among pregnant women in the Savar area.

Purpose of study: To assess the awareness and practice about water consumption and associated health effects in pregnant women in savar.

Duration: 6 months.

Confidentiality: The data provided by the participant will be considered strictly confidential

and will not be given to others without written permission from the participant.

Right to Refuse or Discontinue: The participant has the right to discontinue or decline the participation in the research anytime he/she feels he/she wants to do so.

- ✓ I confirm that my participation in this research project is voluntary.
- ✓ I acknowledge that I will not be receiving any payments in regard to my participants.
- ✓ I confirm that I have the right to decline or discontinue my participants in this research when
- ✓ I have a valid reason to do so.
- ✓ I have read and understand what the research is all about.
- ✓ I understand that the researcher will not identify me by my name in any reports and will publish it in books, newspapers, journals and other research-related projects.

Signature of Participants

Questionnaire

Sociodemographic Characteristics

No	Question	Coding Category	Response
1	Age:		
2	Occupation	1= Student 2= Self Employed 3= Service 4= Housewife	
3	Level of education:	1= No formal education 2= Primary education 3= Secondary education 4= Tertiary education	
4	Type of residing area	1= Rural 2= Semi-urban	
5	Gestational Age (How far along are you in your pregnancy?):	1= Second trimester 2= Third trimester	

Anthropometric Measurements

No	Question	Coding Category	Response
6	Weight (kgs):		
7	Height (ft):		
8	BMI status:		

Knowledge about water intake

No.	Question	Coding Category	Response
9	In daily life which among these do you think of these do you think can contribute the most to your hydration?	1= Plain Water 2= Oral Saline 3= Fresh Juice 4= Don't Know	
10	In your opinion, what is the minimum daily requirement of water for an adult?	1= 4 glasses or less (<1 Liter) 2= 4-8 glasses (1-2 liter) 3= 8-12 glasses (2-3 liter) 4= More than 12 glasses	
11	What benefits of proper hydration during pregnancy are you aware of? (Select all that apply)		
11.1	Improves digestion and prevents constipation	1= Yes 2= No	
11.2	Helps form amniotic fluid	1= Yes 2= No	

- | | | |
|-------------|---|-----------------|
| 11.3 | Reduces the risk of urinary tract infections (UTIs) | 1= Yes
2= No |
| 12 | Do you think excess drinking of water is harmful | 1= Yes
2= No |

Fluid Intake Practice:

No	Question	Coding Category	Response
13	How many glasses of water do you drink per day?	1= 4 glasses or less (<1 Liter) 2= 4-8 glasses (1-2 liter) 3= 8-12 glasses (2-3 liter) 4= More than 12 glasses	
15	Do you consume any other fluid regularly besides water? (Milk, Juice, Juice, Tea/ coffee)	1= Yes 2= No	
14	What do you prefer drink when you are outside and feeling thirst	1= Water 2= Carbonated beverage 3= Juice	
16	From which source do you drink water?	1= Tap water 2= Boiled 3= Water filter 4= Tube well	

Health Effect

No	Question	Coding Category	Response
17	Did you find any of these signs?		
17.1	Feeling extremely thirsty and dizziness	1= Yes 2= No	
17.2	A dry skin and lips	1= Yes 2= No	
17.3	Having dark colored urine	1= Yes 2= No	
17.4	Strong-smelling urine	1= Yes 2= No	
17.5	Constipation	1= Yes 2= No	
18	How many times do you pass urine in a day?	1= 2-4 2= 5-7 3= 8-10 4= More than 10	

- 19** Have diagnosed with a urinary tract infection (UTI) during this pregnancy?
1= Yes
2= No
- 20** Amniotic fluid index
1= Oligohydramnios
2= Adequate
3= Polyhydramnios

Appendix 2: Synopsis

Daffodil International University
Department of Nutrition and Food Engineering (NFE)
Faculty of Health & Life Sciences (FHLS)
Daffodil International University
Daffodil Smart City, Birulia, Savar, Dhaka – 1216, Bangladesh

Student's Name: Mir Monadil Hasan

ID: 201-34-274

Section: 201-C

1. Title: “Knowledge and practices of water consumption and associated health effects among pregnant women in Savar: A Cross-Sectional Study”

2. Introduction

2.1. Background

Water is crucial for human health, especially during pregnancy, as it supports temperature regulation, nutrient transport, and waste elimination. Pregnant women need more water due to physiological changes and fetal development. Adequate hydration impacts maternal and fetal health, influencing amniotic fluid and nutrient transfer. (Institute of medicine, 2005).

Despite its importance, many pregnant women are unaware of their increased hydration needs, risking dehydration and associated issues like headaches, nausea, reduced amniotic fluid, preterm labor, and urinary tract infections (American College of Obstetricians and Gynecologists (ACOG), 2021). Awareness and practices vary significantly due to cultural, socioeconomic, and educational factors, affecting both immediate and long-term health outcomes for mother and child.

This study assesses the knowledge and practices of water intake and hydration among pregnant women to develop targeted educational programs that promote optimal hydration, improving maternal and fetal health outcomes.

2.2 Rationale

Proper hydration is essential during pregnancy for various reasons. One of the primary roles of water is to help maintain blood volume, which is necessary to transport nutrients and oxygen to the placenta and the developing baby. Amniotic fluid, which surrounds and protects the fetus, is primarily composed of water (Complete Womens Care, 2023). Despite these increased needs, many pregnant women are unaware of the importance of sufficient water intake, which can lead to dehydration and associated health risks such as preterm labor, low amniotic fluid, and urinary tract infections (Mayo Clinic, 2021)

Research indicates that knowledge and practices regarding hydration during pregnancy vary widely, influenced by factors such as socioeconomic status, and education level and some other parameters. In pregnancy women become vulnerable that's why other water borne diseases (e.g., diarrhea, cholera, dysentery) may also show adverse effect to both

mother and fetus. This study aims to evaluate the knowledge and practices related to water intake and hydration among pregnant women. The insights gained will inform the development of targeted educational interventions designed to promote optimal hydration and improve health outcomes for both mothers and their infants.

2.3 Research Question or Hypothesis

What is the knowledge level and practices regarding water intake among pregnant women and how do these factors affect their hydration status and health outcomes?

3. Objectives

3.1 General Objective

The aim of the study is to assess the knowledge, practices, and health effects related to water intake and hydration status among pregnant women.

3.2 Specific Objectives

- To evaluate knowledge of pregnant women about water intake during pregnancy.
- To identify the water consumption practices among pregnant women.
- To examine the relationship between water intake knowledge, practice, hydration and other health complications.

4. Methodology

- A cross-sectional study design will be employed to assess the knowledge, practices, hydration status, and health effects of water intake among pregnant women. Pregnant women who came for checkup at Safat Clinic & Diagnostic Center and who are willing to participate in the survey will be selected for the research.
- Data will be collected by live interview using a self-administered questionnaire. Questionnaire include sociodemographic information, knowledge about water intake and hydration, water intake practices and their health outcomes. Ultrasonogram report will be used to find the amniotic fluid index of the participant.
- Statistical analysis will be done using IBM Statistics SPSS version 27.0
- All the information about this research will be clearly stated in the consent form of the questionnaire and the data will remain confidential and the participant will voluntarily participate in the survey.

5. Expected Outcomes

- Identification of the current level of knowledge among pregnant women regarding water consumption and hydration.
- Relationship between water intake and the occurrence of pregnancy-related complications such as low amniotic fluid levels, urinary tract infections and overall maternal well-being
- Identification of specific areas where educational interventions are needed to improve hydration knowledge and practices among pregnant women.

6. Socio-economic Impact

Identifying gaps in knowledge and practices, the study can contribute to the development of targeted educational programs aimed at promoting adequate hydration, potentially improving health outcomes for both mothers and their babies.

7. Time Schedule of Activities:

Task	Activities by months (2024)					
	June	July	August	September	October	November
Literature research	→					
Study protocol & questionnaire development	→					
Ethical Approval		→				
Pretesting of study protocol & questionnaire development		→				
Data collection phase			→			
Data analysis & Report writing				→		
Report submission						→

8. References:

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9. Signature of Supervisor

Signature of Supervisor



Dr. Md. Mahbubur Rahman
Associate Professor
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Signature of Co-Supervisor



Md. Harun-Ar Rashid
Assistant Professor
Department of Nutrition and Food
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